

DEVICE ENABLING THE WASH FILTERING AND
CONDITIONING OF AIR OR A GAS

5 The present invention relates to a device enabling the wash filtering and conditioning of air or a gas.

It may be used for all types of gas flows, but is intended in particular for air conditioning installations, whether for domestic applications or workplace applications, such as industrial premises or computer rooms, work rooms, hotel or office complexes,
10 etc.

It is known to pass air or a polluted gas through a washing liquid in order to filter it. Numerous installations using this principle are known. They make use of various procedures, such as a fluid or bubble-through screen, all of which present the problem of
15 regenerating the washing liquid, since the effectiveness of the process is naturally a function of the quantity of impurities this liquid contains.

Two means are currently used:

- 20 a) Feeding and continuous ejection of the liquid, which entails a prohibitive level of consumption of the latter, even if it is water.
- b) Liquid in closed circuit. In this case, the installation has to be stopped periodically to replace the liquid which has become charged with impurities or to replace the filters
25 whereof the task is to trap them, which may entail a major inconvenience, and in any case requires monitoring and intervention by specialized staff in large installations.

Moreover, washing of the gas flow is frequently followed by passing it through a filter intended to intercept certain impurities which have not been retained by the liquid.
30 Either this filter is effective, and it clogs rapidly, bringing about a loss of head, which requires it to be replaced frequently, or, in order to avoid this problem, it is ineffective

and procedure performance is limited.

The device according to the present invention obviates all these disadvantages. In fact, it makes it possible to provide a treatment station with a very high level of effectiveness which can function without any monitoring, the liquid being regenerated automatically and the filters being washed continuously or periodically.

It comprises the combination of an enclosure for washing and conditioning the gas flow, this enclosure being associated with a closed-circuit washing liquid filtration system with automatic elimination of impurities, the gas flow being successively washed by bubbling through, then by passing through a surface-water zone and filtered through a continuously washed fibre filter, before passing through an evaporator and a condenser, an electronic control unit enabling automatic functioning of the entire device.

The attached drawings, which are given by way of non-restrictive example of one of the embodiments of the subject of the invention, show the following:

Figure 1 is a diagrammatic view showing a vertical section through the entire device, and

Figure 2 is a horizontal section of the treatment enclosure, along the arrows A-A in Figure 1.

The device, in Figures 1 and 2, comprises a treatment enclosure 1, a closed washing circuit with a pump 3 and a filter 4, and an electronic control unit 5.

The treatment enclosure has in its lower part a washing liquid reservoir 6, in its central part a fibre filter 7 and in its upper part a condenser 8 and an evaporator 9, these last being connected to a reversible refrigerating assembly 10.

The gas flow is drawn in by means of a turbine 11 and enters an annular tank 12 located within the enclosure 1 and immersed in the liquid reservoir 6 just below its upper level 13. This annular tank is provided with a series of perforations 14 which are downwardly directed and preferably extended by means of tubular elements 15.

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The gas flow enters the washing liquid by passing through these perforations and these tubular elements, and rises towards the surface of the liquid, passing through the central opening 16 of the annular tank 2; it arrives in a surface-water zone 17 which is located between the said surface and the fibre filter 7, passes through the latter, in which
10 the impurities remaining in suspension are removed from it, then passes through the condenser 8 and the evaporator 9, by means of which its moisture content and/or its temperature are adjusted as required. Finally, it leaves the enclosure 1 through a pipe 18 located in the upper part.

15 The washing circuit comprises an exit pipe 20, a filter 4, a pump 3, an entry pipe 21 and a pressurized clean-liquid feed 22 which, by way of a series of electric valves 23, 24, 25, 26, enables either the volume of washing liquid to be topped up when the need arises, or the filter 4 to be washed in counter-flow periodically, these operations being controlled by the electronic control unit 5.

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The exit pipe draws off the liquid in the enclosure from the bottom thereof and from the surface of the liquid reservoir 6, in order that both the heavy impurities falling to the bottom of the treatment enclosure and the light impurities such as soot floating on the surface of the washing liquid are entrained. This arrangement enables the device to be
25 particularly well adapted to the treatment of fumes.

The washing liquid from which impurities have been removed flows in from the entry pipe 21 at a level above the fibre filter 7, which enables it to be washed continuously and kept humid and thus to maintain optimum effectiveness all the time.
30 Moreover, this makes it possible to use a thick filter of more than 5 millimetres, comprising fibres which do not repel water and which would otherwise be clogged up very rapidly.

Functioning of the device is entirely automatic, as a result of the electronic control unit 5 which is connected on the one hand to sensors for opacity 27 and surface level 28, located in the washing liquid reservoir 6, and on the other hand to sensors for temperature 29, humidity 30 and pressure 31, installed in the space from which the gas to be treated arrives. The control unit controls the starting or stopping of the pump 3 and the turbine 4 and the opening or closing of the electric valves 23, 24, 25, 26, and drives the refrigerating assembly 10, in dependence on the information thus received and an incorporated program.

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The positioning of the various component elements provides the subject of the invention with a large number of useful effects which have not hitherto been obtained by similar devices.

CLAIMS

1. Device enabling the wash filtering and conditioning of air or a gas, which may be used for all types of gas flows, but is intended in particular for air conditioning
5 installations, whether for domestic, workplace or industrial applications, characterized by the combination of a treatment enclosure (1) enabling the washing, filtering and conditioning of the gas flow, this enclosure being associated with a closed-circuit washing liquid filtration system with automatic elimination of impurities, the said enclosure being designed such that the gas flow is successively, from bottom to top, washed by bubbling
10 through a washing liquid reservoir (6) located in the lower part, then by passing through a surface-water zone (17) and filtered through a continuously washed fibre filter (7), before passing through a condenser (8) and an evaporator (9) which are connected to a refrigerating assembly (10), functioning of the entire device being made entirely automatic by means of an electronic control unit (5).
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2. Device according to Claim 1, characterized in that the gas flow, which is drawn in by a turbine (11), enters the enclosure (1) by way of an annular tank (12) located within the latter and immersed in the liquid reservoir (6) just below its upper level (13), this annular tank being provided with a series of perforations (14) which are downwardly
20 directed and through which the gas flow enters the liquid before rising towards the surface of the liquid, passing through the central opening (16) of said annular tank 12.
3. Device according to Claim 2, characterized in that the perforations (14) are extended by means of tubular elements (15).
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4. Device according to any of the preceding claims, characterized in that the washing circuit comprises an exit pipe (20), a filter (4), a pump (3), an entry pipe (21) and a pressurized clean-liquid feed (22) which, by way of a series of electric valves (23, 24, 25, 26), enables either the volume of washing liquid to be topped up when the need arises, or
30 the filter (4) to be washed in counter-flow periodically, these operations being controlled by the electronic control unit (5).

5. Device according to Claim 4, characterized in that the washing liquid from which impurities have been removed flows in from the entry pipe (21) at a level above the fibre filter (7), which enables it to be washed continuously and kept humid.

5 6. Device according to Claim 4, characterized in that the exit pipe (20) draws off the liquid in the treatment enclosure (1) from the bottom thereof and from the surface (13) of the liquid reservoir (6), in order that both the heavy impurities falling to the bottom of the treatment enclosure and the light impurities floating on the surface of the washing liquid are entrained.

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7. Device according to any of the preceding claims, characterized in that the fibre filter (7) has a thickness greater than 5 millimetres and comprises fibres which do not repel water.

15 8. Device according to any of the preceding claims, characterized in that the electronic control unit (5) is connected on the one hand to sensors for opacity (27) and surface level (28), located in the liquid reservoir (6), and on the other hand to sensors for temperature (29), humidity (30) and pressure (31), installed in the space from which the gas to be treated arrives, the information thus received being used in a manner controlled
20 by an incorporated program to control the starting or stopping of the pump (3) and the turbine (4) and the opening or closing of the electric valves (23, 24, 25, 26) and driving of the refrigerating assembly (10).

ABSTRACT

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The present invention relates to a device enabling the wash filtering and conditioning of air or a gas.

It comprises the combination of an enclosure (1) for washing and conditioning the
10 gas flow, this enclosure being associated with a closed-circuit washing liquid filtration
system with automatic elimination of impurities, the gas flow being successively washed
by bubbling through, then by passing through a surface-water zone (17) and filtered
through a continuously washed fibre filter (7), before passing through an evaporator (9)
and a condenser (8), an electronic control unit (5) enabling automatic functioning of the
15 entire device.

It may be used for all types of gas flows, but is intended in particular for air
conditioning installations, whether for domestic applications or workplace applications,
such as industrial premises or computer rooms, work rooms, hotel or office complexes,
20 etc.

